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The Outlook

The War in the East

EACH account which comes in goes to show, with ever increasing clearness, that the rapid success of the Germans has been due to intensive use of internal combustion engines (perhaps occasional C.I. engines too) in the air and on the ground. They aimed at complete air superiority, and seem to have, for all practical purposes, attained it. They started by persistent bombing of the Polish aerodromes, and thereby put much of the Polish air corps out of action. Then the German armoured cars and tanks, helped by the dry weather, raced ahead, and the bravery of Polish infantry and cavalry could do little or nothing to stop them. It may perhaps prove that this will be the last war in which a belligerent will rely largely on horsed cavalry to oppose a mechanised army.

It may, however, also be the last major campaign in which an air arm will be able to play such a very important part in bringing about a rapid success. An air arm which is not opposed by one of approximately equal strength must have a well-nigh decisive effect in a battle or a campaign. We have seen the same thing happen recently on a smaller scale in Abyssinia, in Spain and in China. The result, it should be emphasised, depends on the absence of adequate air opposition. Small nations will be wise to take this lesson to heart.

The modern aeroplane is an expensive thing compared to what a wooden machine used to cost in 1915, and one cannot expect every Ruritania to maintain an air arm equal to that of the Germans. But even the modern aeroplane is cheap compared to a cruiser, to a Maginot line, or to various other weapons of modern war, and the tragedy of Poland shows that bravery is useless when pitted against machine power. Every nation which values its independence must, to the best of its ability, arm in the air. If Germany had been opposed in the air her advance would have been retarded.

The War in the West

OPERATIONS on the Franco-German frontier have not yet reached the stage when any outstanding military lesson can be drawn from them. On the Western front all arms are being used in combination, each helping the others. We do not yet know whether the defence, represented by the prepared lines of fortresses, will prove the determining factor, but we hope, as we read of the careful, and evidently skilful, French advance towards the Westwall, that the skill of General Gamelin and the magnificent training of the French Army will find means of breaking through that formidable but hastily constructed barrier. Our own troops are most certainly anxiously waiting for their turn to share the work with their French Allies. Perhaps before these words are published they will have given the enemy a taste of their quality.

Aircraft are not dominating the scene in the West, but they are being used scientifically by the Higher Command to extend the bombardment beyond the range of the guns. In this work we know that British machines are playing an active part. There is, of course, no terrorisation of civil populations, but there are grounds for believing, despite the brevity of the French communiqués, that British and French bombers have been actively engaged in attacking the reinforcements which the Germans have sent up from the Eastern front. The Allied advance has also forced the Germans to withdraw air squadrons from the East and send them to the West. There is, however, nothing to suggest that the Germans have been able to prevent the French from moving their troops forward according to their plans.

Complete superiority in the air, when the air arms are approximately equal at the start, is a thing which, we are told, must not be expected in modern war; but local air superiority can be attained. The evidence to date points to the Allies having that superiority on the Western front. If the Polish Army is able to continue

"Flight" photograph.

GETTING READY FOR ACTION. Refuelling Bristol Blenheims.

to resist, the Allied pressure on the West is the best possible way of easing the pressure on it. The German squadrons which come from the East to the West may arrive flushed with a comparatively easy victory—perhaps some of them have had easy victories in Spain as well—but they will soon find that on the Western front they are not all-conquering and irresistible.

Loss of H.M.S. Courageous

NO one denies that the loss of H.M. Aircraft Carrier *Courageous* is a heavy loss, and everybody will feel great sympathy for the relations of those who perished in her. To the staff of *Flight* the sinking of this ship in particular comes home with a realisation of personal loss, as only last spring members of our staff enjoyed the hospitality of her then Commanding Officer, Capt. M. L. Clarke, and his ship's company, including Wing Commander (now Group Capt.) Noakes.

No fighting Service expects to go through a war without loss, and apart from personal tragedies one has to look on each clash with the enemy from the point of view of profit or loss, as likely to affect the ultimate issue of the war. Early in the last war we lost a battleship, H.M.S. *Audacious*, which struck a mine, and the news was kept secret for a long time after. As Germany had then a very powerful fleet in being, that was a much more serious blow than the loss of the *Courageous* is now. We still have, commissioned or building, ten aircraft carriers, apart from those used for training and experimental work, and not counting the seaplane carrier *Albatross* which was transferred from the Royal Australian Navy; while an eleventh has been provided for in Naval Estimates, but has not yet reached the stage of receiving a name. France has three. Germany has recently launched the *Hindenburg*.

Of non-belligerent powers, Italy has not built any carriers, holding that her shore-based aircraft are more effective than ship-planes over the Mediterranean; Japan has altogether thirteen aircraft carriers and seaplane carriers, but of these only eight are of 10,000 tons or over, and only two of over 26,000 tons. Only the United States surpasses our Navy in naval air strength, having eight carriers built, two of which are 33,000-ton ships. Our superiority over the German Fleet is hardly affected by the loss of the *Courageous*.

The Value of Carriers

THERE is little chance that the German Fleet will attempt to fight a Jutland in this war. It is far too small, and one of its "pocket battleships" has been seriously damaged by a bomb. The German Navy will, as in the last war, dominate the Baltic, but so far as the other seas are concerned the only chance for its surface ships is to break away and act as commerce-raiders. The main object of the Royal Navy, on the other hand, is to keep the seas free for our own and neutral merchant ships, and to deny them to the enemy. For this purpose, aircraft carriers, which are unlikely to be needed for a fleet action, are very valuable, as their aircraft give them a wide range of vision. In doing this they run risks, and risks must sometimes mean losses. The *Courageous* has paid the price of useful service.

Calling-in at Buffalo Airport for a visit to the Curtiss Wright Airplane Division. Picture taken by the author from a D.C.3.

AMERICAN METHODS and MODES

Random Impressions of a British Engineer's Visit to the United States

By J. I. WADDINGTON, M.A., A.F.R.Ae.S.

IN writing these notes on my visit to American aircraft and engine factories I am conscious of two feelings: One is a strong regret that lack of time prevented me from getting out to the west coast to visit the big plants out there—Lockheed, Douglas, Boeing and so on. The second is one of sincere gratitude to all the aviation people I met, directly and indirectly connected with factories, for the facilities they offered me to inspect their plants.

I was very lucky to have an introduction, when I first arrived in New York, to Mr. Jimmy Taylor, one of the United States premier free-lance test pilots, who has been much in the news lately for having sustained an acceleration of 13½ g. during a test flight in a Curtiss machine. I asked him what it felt like to have so much gravity thrust upon him, but the only thing of which he would complain was a slightly stiff neck, due to the fact that he did not press back against the head-rest.

My first introduction to American aviation was a visit to Hicksville Aviation Country Club, where Mr. Taylor keeps his own Fleetwing Amphibian, for which type of machine, incidentally, he is the representative. The Fleetwing has very interesting features, though, unfortunately, it is handicapped by its selling price, which is distinctly high even in the United States, where aircraft are comparatively less expensive than they are here; sales of the Fleetwing, consequently, cannot be expected to be very large.

Its primary point of interest is the fact that the whole of the hull is constructed and covered with very thin-gauge stainless steel, using electric seam and spot welding. This material has proved to be very satisfactory in service and requires hardly any maintenance. Accommodation is comfortable and roomy, with seating for four persons; interior decoration is pleasant and forms an efficient soundproofing medium, whilst visibility through the moulded windscreen is remarkably good in all really essential directions.

The wings are of stainless steel construction covered with fabric and the power plant is a 300 h.p. Jacobs radial which gives the machine, when taxying on the water, a most pleasant and quiet "touring" effect, while its manœuvrability on its water rudder allowed us to thread our way easily through the somewhat congested moorings of the Port Washington transatlantic terminus where we dropped in to inspect the newly arrived *Lieutenant de Vaisseau Paris*. The Fleetwing Seabird is most pleasant to fly, cruises happily at 135 m.p.h., and is to all intents and purposes a two-control machine—turns on aileron alone can be made quite comfortably. In spite of the high thrust-line the trim of the boat was excellent; for instance, with hands off the throttle could be pulled back and the nose would rise slightly and then the machine would go into a shallow dive until it regained fore and aft trim. Retraction of the wheel landing gear is very positive in operation and seemingly foolproof.

The Hicksville Country Club had a very good assortment of quite large aeroplanes, all privately owned, amongst which I saw a single-seater Grumman fighter converted into a two-seater coupé, a Waco, a Beechcraft, a Grumman twin-engined amphibian, and, of course, the very popular Stinsons and Fairchilds. Needless to say, the finish on the fabric of these machines was beautiful, primarily due to the use of mercerised fabric, with a surface free from the "fluff" which we are forced to retain on the fabrics we use in England. As American manufacturers have been using this mercerised fabric with complete success for many years, it seems unfortunate that our manufacturers are handicapped by being forced to use the rougher material.

The Port Washington terminus was very interesting, for although we were not allowed near the French flying boat there was plenty to be seen in the service hangars. The

The author and Mr. Jimmy Taylor inspect the latter's Fleetwing Seabird amphibian.

Lieutenant was refuelling, and it seems that its capacity is so great that, according to local observers, fuel is bought, not by the gallon, but by the ton. Amongst interesting machines in the hangars were two Stinsons, one with wheels and one with floats, very beautifully equipped for the newly established New York Police Air Corps; and Sikorskys of various vintages. One of the old Sikorsky types, I was told, was very unpopular with pilots because of its habit of taking green water over the cockpit and behaving in general like a submarine as soon as the engines were opened up for the take-off. It was rather amusing to see the number of "ultra-lights" on floats—Taylor Cubs and Aeroncas. I understand that the take-off technique is most entertaining, comprising as it does a sudden turn when maximum taxying speed has been obtained; this pulls one float up on its step and then an opposite turn brings the other one up!

Mr. Taylor has great hopes for the use of amphibian aircraft in America, which is literally dotted with open spaces of water suitable for boat landings, and, in fact, he suggests that on a transcontinental journey an amphibian would have more choice of emergency landing places on water than on land. To bear out this very interesting theory, Consolidated Aircraft have produced a map of the United States showing the location of water suitable for seaplane landings and take-offs.

Driving back from the Hicksville field, we passed the much-publicised North Beach Airport of New York City, which has so far taken two years to construct, and the date of completion of which seems still to be indefinite. Its layout has provided much criticism, as adequate advice had not been taken from practical flying people. For instance, the new hangars have been built directly beneath the control tower, thereby completely obscuring the view from the latter. The alternatives are, as one humorist suggested, to increase the height of the control tower by 100ft., or to instal television. The airport has been actually a tremendous undertaking, the length of the runways varying from a minimum of 4,400ft. to a maximum of 7,200ft., and as the ground is reclaimed marshland 120ft. piles have had to be driven in for foundation purposes.

On the question of runways there seems to be division of opinion as to the relative advantages of concrete and tarmacadam. The disadvantage of the former is that they tend to have sharp edges and, frequently, a considerable "kerb" effect where the neighbouring soil has eroded. They also suffer badly from temperature cracks. On the other hand, the comparatively loose surface of tarmacadam is thrown up on to airscrews.

In general conversation with people I met at these airports there were some very interesting points raised, and one of the principal topics of conversation was the failure of Imperial Airways to establish a regular transatlantic service; unflattering comments were made about Imperial's organisation on that side of the Atlantic. Apart from the

Not a case of the United States having German measles, but a map of locations of lakes and other stretches of water suitable for seaplane operation.

"One of the most interesting developments I found was the Clark Cabin monoplane."

actual criticism, there was a real feeling of disappointment and regret that we were not taking our part in the service. From this the conversation drifted to the possibility of using big landplanes for transoceanic work, and I understand that Pan-American may, in the near future, start a mid-week service with Boeing Stratoliners—this will be for mail only, no passengers being carried.

It has been said, in examining the case for the landplane for this work, that even a flying boat could not remain afloat very long, but this is contradicted to a great extent by Pan-American pilots, who maintain that boats could alight on and take-off from the Atlantic in a big proportion of cases. The performance of the big boats is also creeping up to that of the landplanes and the moral effect on the passengers of flying in a boat is considerable.

I also found a division of opinion on the operation of so-called giant aircraft, such as the D.C.4, as many people consider that any airline would be locking away a lot of capital in one machine, particularly as I was told that two D.C.3s carry more, and cost less to run, than one D.C.4. The D.C.4s have, however, one definite advantage—they are capable of carrying their load non-stop from coast to coast.

Stratosphere machines also came in for a certain amount of criticism. It was suggested that what they gained in performance above 20,000ft. was not worth the difficulties encountered, and if altitudes of around 35,000ft. were to be used for operation all cabin supercharging equipment ought to be duplicated with a consequent sacrifice in weight, as if a failure occurred on a single unit at such a height passengers would be dead before the pilot, possibly equipped with independent oxygen supplies, could get the machine down to a reasonable altitude. It had been hoped that by climbing to sub-stratosphere heights thunderstorms would be avoided, but, unfortunately, it seems they have still been recorded even at these heights.

Amongst other miscellaneous impressions, I found that the general opinion was that tricycle undercarriages were definitely on their way, and that even Army and Navy tenders allowed for them in makers' specifications. Rotating wing aircraft are regarded with considerable reserve; although everyone agrees about their theoretical advantages, there seems to be no great enthusiasm about their flying characteristics, although a "shuttle" mail service had just been established between Philadelphia Post Office and the airport, using such a machine.

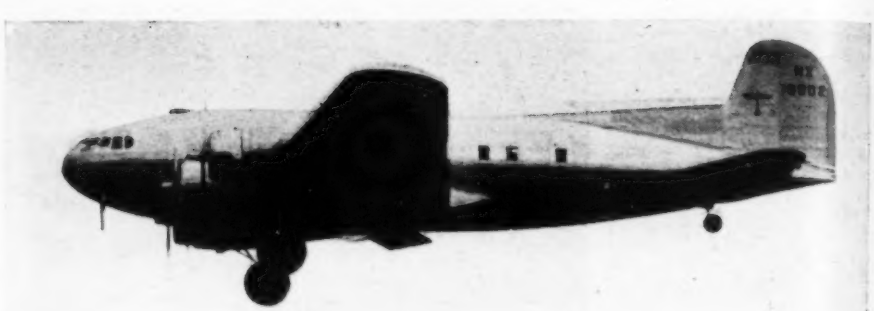
One of the most interesting developments I found in aircraft structures was the Clark cabin monoplane, powered by a 450 h.p. Ranger engine. The Duramold process, using an "improved wood," enables the whole of the fuselage to be moulded under combined pressure and heat. The lines, finish and smoothness are unbelievably good, although the skin thickness is only one-seventh of an inch and there are only four light transverse frames throughout the whole length of the fuselage. The skin is remarkably resistant to impact and, even if pierced, schemes have been developed which enable field repairs to be carried out easily and quickly. For this particular monoplane, which has a length of about 40ft., the total tool cost amounted only to $8,000 and the constructural labour for one fuselage to about 35 man-hours only. Such figures open up huge possibilities for cheap quantity production.

Useful Air Travel

In America flying seems to be more natural than any other form of transport. It is certainly the most comfortable, and allows one to do business at considerable distances from one's base within a reasonable out-and-home time. For instance, I had arranged to visit the Curtiss Airplane Division of the Curtiss Wright Corporation at Buffalo, some 300 miles from New York. I left that city at 9 a.m. and arrived at Buffalo at 11 a.m., our D.C.3 having encountered headwinds. I spent until six o'clock in the evening wandering around the factory, after which I was taken to see the "sights," which consisted mainly and adequately of Niagara Falls, then to dinner and the 9.30 p.m. machine from Buffalo, which got me back to Newark (New York's airport) at 11 p.m. Six hundred miles covered, with 10½ hours at my destination, all in an easy day's work.

The D.C.3s of American Airlines are extremely comfortable and the service very efficient. Air hostesses minister to the traveller's wants, at least to the extent of supplying anything between the *New York Times* and a Coca-Cola, and one is cheered by interesting mid-flight bulletins issued by the pilot, giving a forecast of the arrival time at one's

"I also found a division of opinion on the operation of so-called 'giant aircraft,' such as the D.C.4."



"I understand that Pan American may, in the near future, start a mid-week service with Boeing Stratoliners."

destination, with the air speed, ground speed, outside ground temperatures, altitudes above sea level (we flew at 9,000ft. on the return journey) and ground level, and rounded off, under "remarks," by some little item which the pilot thinks suitable to the conditions and occasion. On this particular flight it read: "We think it much nicer to be sailing along in this nice cool air than bending over some hot stove working our fingers to the bone, as many of the people below us must be doing."

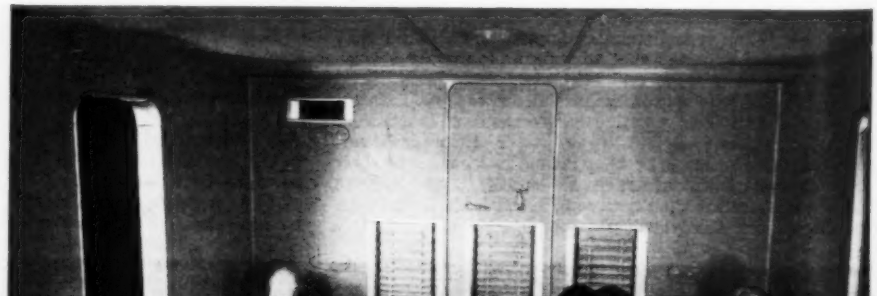
On arrival at Buffalo Airport I was met by Mr. A. D. Palmer, Junr., of the Curtiss Airplane Division, who was to be responsible for my tour round the plant and whose duty it was to ensure that I saw all that I ought to see—and nothing of several things that I wanted to see. He proved the toughness of the American aviation breed by not so much as wilting under the barrage of questions I fired at him throughout the day.

The first bit of information he gave me was that the Consolidated flying boat destined for the R.A.F. had alighted that morning on Lake Erie, Buffalo, to refuel. She had been scheduled for a non-stop flight from San Diego to Botwood, Newfoundland, but had encountered consistent headwinds and had wisely decided to refuel for the last stage of her journey before her transatlantic hop. These boats have all been delivered by air as an everyday routine, and in doing this some remarkable unpublished long-distance flights have been made.

As I was offered the opportunity of seeing this boat—at least from a distance—the firm's Stinson seaplane was run out and we were flown the few miles to where she lay at her moorings. Our pilot on this occasion was Mr. Lloyd Childs, who recently, in the course of tests for the French Air Ministry, dived a Curtiss Hawk 75 at a speed in excess of 575 m.p.h. The Stinson is a good aeroplane, but I was relieved to discover that Mr. Childs did not make a habit of this manœuvre.

I spent a most enjoyable afternoon at the Pan-American Airways service base at Baltimore. All repairs to the Clipper ships are done on the premises and the shops there are well equipped for such operations. All major engine overhauls are done on the ground with jury engine mountings, so that, on completion of the work, the engines are lifted straight into place in the aircraft. For work on the Clippers, Pan-American service engineers have designed most impressive steel-frame platforms, three and four storeys high, and mounted on trolleys so that they are completely mobile. These platforms are equipped with miniature workshops, air pipe-lines, oil drains and filters, and drains and filters for the mineral spirits used in cleaning down the engines. The latest model of this "workshop on wheels" weighs 26,000lb. and is justified by the resultant cleanliness and efficiency with which the engine maintenance is carried out. The service and maintenance of the 14ft. airscrews is also very thorough as they are changed every third trip and subjected each time to Magnaflux examination and rebalancing. An idea of their service life is given by the experience gained on one of the Sikorskys over 2½ years' service, during which three sets of airscrews were used.

Whilst I was at the Pan-American base I witnessed the arrival of the last Boeing Clipper to be delivered, and I was very impressed by the way her chief pilot manœuvred her up to the landing stage as if she had been only a small motor boat. I was fortunate in being allowed to spend a considerable time inspecting the *Dixie Clipper*, which was then in for maintenance service; and the comfort, not to say luxury, of its internal arrangements must be seen to be believed. Amongst other things, aft of the main compartments there is a small private two-berth state-room, going by the name of the Honeymoon Suite. The berths are models of comfort, and are six inches longer and four inches wider than the standard Pullman sleeper berths.



"The comfort, not to say luxury, of the internal arrangements of the *Dixie Clipper* must be seen to be believed."

One obtained a very vivid impression of the size of these boats when one stood almost upright in the actual stub of the wing and walked along the cat-walks to the miniature engine rooms in the wings, which provide adequate working space for engine repairs whilst in flight. These have actually been successfully undertaken during tests. Another impressive sight was that obtained when standing on top of the wing centre-section and seeing the vast expanse of wing area on either hand. The present Clippers are operating at the gross weight of 82,500lb., but this is shortly being put up to 83,500lb. and then to 90,000lb. I hear that Martins are at work on a boat of 225ft. wing span, weighing 180,000lb. and powered by four engines—which would seem to indicate that power plants of between four and five thousand horse-power are well on the way in American factories

I discussed the behaviour of the sponsons or seawings on the Clippers, which, incidentally, carry 1,500 gallons of the total load of 2,100 gallons of fuel. Although the Pan-American people defend them, I had a feeling that they needed some defence, since it was admitted that during sharp turns not only had a sponson submerged but the corresponding wing tip had also done so, whereas, using wing-tip floats, it would be difficult for this to occur. The sponsons are very poor aerodynamically and must offer a big drag both on the water and in the air—not to speak of weight sacrifices. The retractile wing tip float of the R.A.F. Consolidated boat came under discussion, and the general feeling was that the questionable gain in performance is certainly not worth the increase in weight and additional mechanical complication.

Pan-Americans have deservedly made very rapid progress during the last ten years. In 1928 they were operating on 251 miles of route, carried 9,500 passengers, and 270,155lb. of freight. Last year these figures were 54,500 miles, 225,000 passengers and 4,500,000lb. of freight. As regards ocean flying I am afraid we have a lot of leeway to make up as Pan-American Airways have logged 4,400,000 ocean miles against Imperial Airways' 242,000. These figures are, of course, for both Pacific and Atlantic flights.

(To be continued.)

CIVIL RESTRICTIONS

THREE weeks ago the Air Ministry announced the Air Navigation (Emergency Restriction) Order, 1939, in *Notice to Airmen*, No. 271. Since then, a further series of regulations have been issued, entitled the Air Navigation (Restriction in Time of War) Order, 1939.

This order forbids the flight, or attempted flight, of any aircraft over the United Kingdom or its territorial waters, except under the authority of, and in accordance with the terms and conditions of a permit in writing issued by the Secretary of State. Machines with a permit are also restricted.

1. No aircraft may fly over any of the following prohibited areas:—

(a) Existing prohibited areas as defined in Schedule VII to Air Navigation (Consolidation) Order, 1923.

(b) An area as set out on a map attached to the Order. This comprises the portion of England and Scotland (and the territorial waters) east of a line drawn in a northerly direction from a point near Poole (50° 40′N, 01° 50′W) by way of Salisbury, Kingsclere, Oxford and Pershore to a point in the Pennines (54° 17′N, 02° 00′W), i.e., five miles East of Aysgarth, North Riding, the line passing to the west of Birmingham and through Cannock, Leek and Skipton; thence, in a north-westerly direction, to a point near Riccarton Junction in Roxburgh (55° 18′N, 02° 51′W); thence north-westerly to a point (55° 44′N, 03° 56′W), near Wishaw, Lanarkshire; thence due north to Stirling; and thence north-easterly, via Perth, to Stonehaven in Kincardineshire. An "enclose" for landplanes exists at Shoreham Airport.

(c) The neighbourhood of Invergordon, Castletown (Weymouth), Plymouth and Scapa Flow.

(d) An area within a circle of radius of three miles centred near Castletown at a point Lat. 50° 34′ 00″ N., and Long. 02° 26′ 00″W.

(e) An area within a six-mile circle with a centre at Plymouth (Lat. 50° 21′ 30″N and Long. 04° 07′ 30″W.)

(f) An area within straight lines joining Stromness, Kirkwall, Burray, Turn Ness, Rora Head and Stromness.

2. All landplanes entering the United Kingdom must do so at Shoreham Airport, Belfast Harbour Airport, Bristol (Whitchurch) Airport, Liverpool (Speke) Airport, or Perth Airport.

All flying boats and seaplanes entering the United Kingdom must do so at Poole Harbour Airport or Pembroke Dock.

These airports must be approached by the following routes:—

Shoreham Airport, by a corridor two miles wide, extending from the airport in a south-south-easterly direction to the limit of territorial waters.

Belfast Harbour Airport (a) by a corridor two miles wide extending from the airport on a bearing 33° True to the limit of territorial waters; (b) alternatively, by a corridor two miles wide extending from the airport in a southerly direction along the Belfast-Portadown-Newry-Dundalk railway line to the boundary of Northern Ireland.

Bristol (Whitchurch) Airport by a corridor two miles wide extending from the airport in a westerly direction to Long Ashton railway station, thence along the Long Ashton-Weston-super-Mare railway line to Weston-super-Mare, and thence by a corridor four miles wide on a bearing 265° True, to the limit of territorial waters.

Liverpool (Speke) Airport by a corridor four miles wide extending from the airport on a bearing 280° True, to the limit of territorial waters.

Perth Airport by a corridor two miles wide extending from the airport to Stonehaven railway station, thence to Oldmeldrum railway station, thence through Peterhead to the limit of territorial waters.

Poole Harbour Airport by a corridor four miles wide extending from Brownsea Castle in a south-easterly direction to the limit of territorial waters.

Pembroke Dock Airport by a corridor ten miles wide extending from the airport in a south-westerly direction to the limit of territorial waters.

All landplanes, flying boats and seaplanes must use the same airports and routes when leaving the United Kingdom.

3. No flying between sunset and sunrise is permitted.

4. All aircraft must fly within view of the ground; no aircraft may fly at a height greater than 3,000 feet from the surface; nor less than 1,000 feet unless, owing to weather conditions, it would not be visible from the ground at that height.

5. The carriage of arms, munitions of war and explosives (except pyrotechnics for signalling purposes) is forbidden.

6. The carriage of photographic apparatus and photography from the air are forbidden.

7. The transmission of wireless messages, except messages relating solely to the control, safety or route, is forbidden.

8. No unauthorised signal may be given from an aircraft, and no Naval, Military or Air Force signal may be given unless it is authorised. No authorised signal may be used except for the purposes for which it is authorised.

9. All aircraft are required to carry documents showing:—

(i) The name, permanent address and nationality of each member of the crew and each passenger in the aircraft and each passenger's destination.

(ii) Particulars of the cargo, including the nature of the contract of carriage, the name and address of the consignor and the destination of the goods.

10. Flying in such a manner as to endanger or to be likely to endanger any of His Majesty's forces, ships or aircraft or to interfere with their movements or operations is prohibited.

11. The nationality, registration and other prescribed identification markings of an aircraft must be clearly displayed and the display of false markings is forbidden.

Contraventions of any of the foregoing restrictions are punishable on summary conviction with a fine not exceeding £200 or imprisonment for a term not exceeding six months, or both

An aircraft flying over prohibited area, or between sunset and sunrise or entering or leaving the United Kingdom otherwise than along one of the prescribed routes, is required to give the signal of distress and forthwith land at the nearest aerodrome in the United Kingdom. It must not fly further into a prohibited area unless and except it is compelled to do so by weather or in order to land at the nearest aerodrome.

In the event of non-compliance with these provisions, the aircraft is liable, after a warning signal has been given to it, to be fired upon or compelled by any other means to comply.

H.M.S. COURAGEOUS SUNK

First Naval Loss in the War

THE aircraft carrier, H.M.S. *Courageous*, was sunk by a German submarine last Sunday, September 17. The submarine was immediately heavily attacked by destroyers, and the Admiralty believes that she was sunk. The survivors of the carrier were picked up by destroyers and merchant vessels. At the time of our going to press the complete list had not been published, but the loss of life is believed to have been heavy.

The Admiralty always requires the most stringent proof before announcing definitely that a submarine has been destroyed, but in this case, with more than one destroyer attacking with depth charges so quickly after the firing of the torpedo, there can be little doubt about the fate of this submarine.

The *Courageous*, which underwent a refit this summer, was commissioned with the Reserve Fleet in August, with a reduced complement of aircraft, and since the outbreak of war she had been doing good service in convoying merchant vessels. By means of her aircraft she could watch a very wide stretch of sea on all sides of the convoy. She was with the Reserve Fleet when the King inspected it recently, and His Majesty went on board her.

"*Flight*" *photograph*

A Fairey Swordfish approaching to alight on the Courageous. Note the escorting destroyer.

The three carriers, *Courageous*, *Glorious* and *Furious*, were ordered by Lord Fisher, then First Sea Lord, in January, 1915, as a new class of cruiser which would rely on speed and gun power rather than on armour for their fighting efficiency. The tonnage of the first two was 22,500. The speed was to be not less than 32 knots. They were to have thin armour, 2in. protected plating on top of 1in. shell plating, and there was to be a modified bulge as some protection against torpedoes. The *Courageous* was built by Armstrongs, and was launched in 1916. The three vessels in 1917 formed the First Cruiser Squadron, operating with the Battle Cruiser Force. In November of that year the *Courageous* took part in a short action, when she opened fire on enemy light cruisers and a submarine, but these escaped behind a smoke screen.

It was afterwards decided to convert these three ships into aircraft carriers, and the *Courageous* was transformed at Devonport Dockyard between 1924 and 1928. The funnel and bridge were located in the superstructure or island on the starboard side of the flying deck. Two hangars were below this deck, with lifts to the flying deck.

When the Admiralty decided to appoint a Rear Admiral (Aircraft Carriers), the *Courageous* was chosen as his flagship, and held that position until the Admiral's flag was transferred to the *Ark Royal* last year. In the naval review off Portland in 1932, King George V went on board the *Courageous*, and to provide for his comfort a special "King's Cabin" was built abaft the funnel on the level of the flying bridge.

Including her construction, reconstruction, and refits, the ship had cost some £5,000,000. Her total complement was 1,216, but at the time of her loss she had a reduced complement of aircraft, and, therefore, a smaller number of pilots, observers and maintenance men on board.

Descriptions of visits to the *Courageous* by members of the staff of *Flight* were published in our issues of January 12, 1933, and March 9, 1939.

Lord Camrose's New Post

LORD CAMROSE has been appointed chief assistant to Lord Macmillan, the Minister of Information, and Controller of Press Relations. The appointment has been made to provide for the Minister that technical and specialised knowledge of newspapers which Lord Camrose possesses, and which Lord Macmillan feels to be necessary. It is also felt that a closer and more intimate contact between the Minister of Information and the Press will be ensured by the new appointment.

Distinguishing the Dorniers

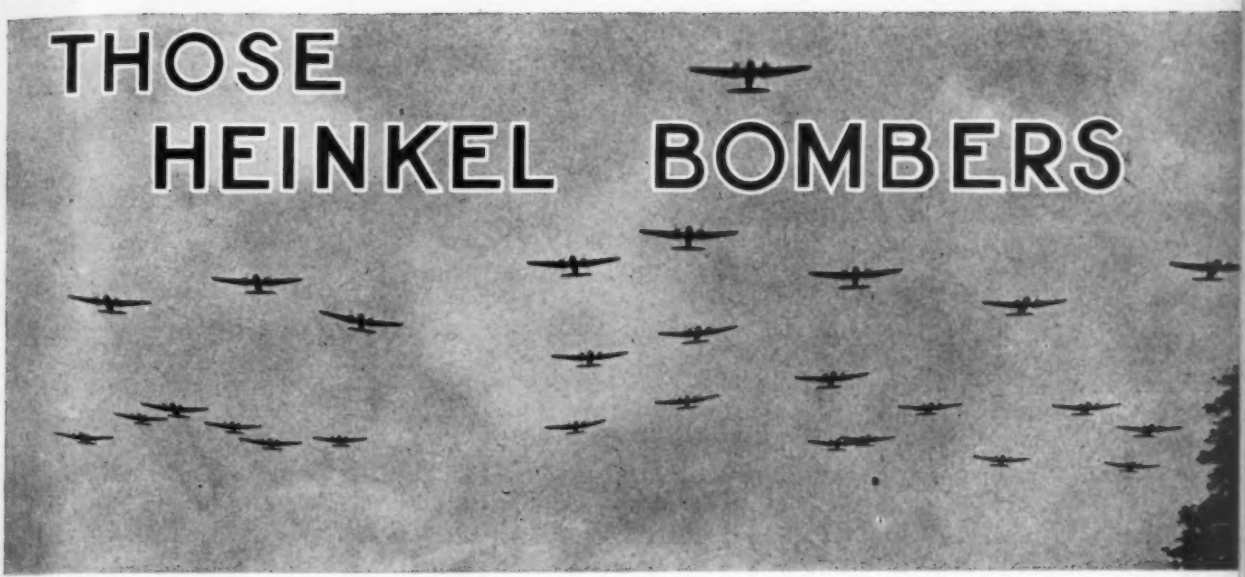
IN the recognition drawings of German aircraft published in last week's issue a transposition of captions occurred. The lower drawing on page *b* shows the Do 215 and that above it the Do 17.

More Commercial Services

IN last week's issue we mentioned that Allied Airways had very soon received permission to reopen their various services. It is now learned that the other company operating in Scotland, Scottish Airways, have also resumed their passenger and freight services between Glasgow (Renfrew), Cambeltown (Kintyre), and Islay (Glenegedale); between Inverness, Wick and Kirkwall; and on the round trip between Kirkwall, Westray, Sanday, Stronsay, North Ronaldshay and Kirkwall. All these are being operated daily, and air ambulance runs are being made when and as necessary.

Although SABENA have been obliged to suspend all their European routes, with the exception of that between London and Brussels, now operated from Shoreham, the service to the Belgian Congo continues to function normally. In fact, so great is the demand that there is a possibility that the frequency may be increased to provide two weekly departures.

THOSE HEINKEL BOMBERS



Exclusive Details of the Efficient He 111s.

By H. F. KING

IF England is attacked by the German *Luftwaffe* Heinkel twin-engined bombers of the genus He 111 will probably compose a large proportion, if not the majority, of the striking force.

The Heinkel He 111 bombers have distinguished forebears, and in the matters of aerodynamic and structural efficiency must be considered thoroughbreds. They are made, to the designs of Professor Dr.-Ing. Ernst Heinkel, by the Ernst Heinkel Flugzeugwerke G.m.b.H. at the big new factory at Oranienburg, near Berlin, at the old Heinkel plant at Marienehe, not far from Rostock, and, in all probability, in certain other works.

Of the Oranienburg factory, Mr. S. Paul Johnston, editor of our American contemporary *Aviation*, wrote in January this year: "... it is probably the finest and best equipped of any aircraft factory in the world to-day. It was built from scratch about a year and a half ago really to *produce* airplanes—and it certainly can, and does. It is now entirely on Heinkel He 111 bombers with Jumo 211 direct injection engines."

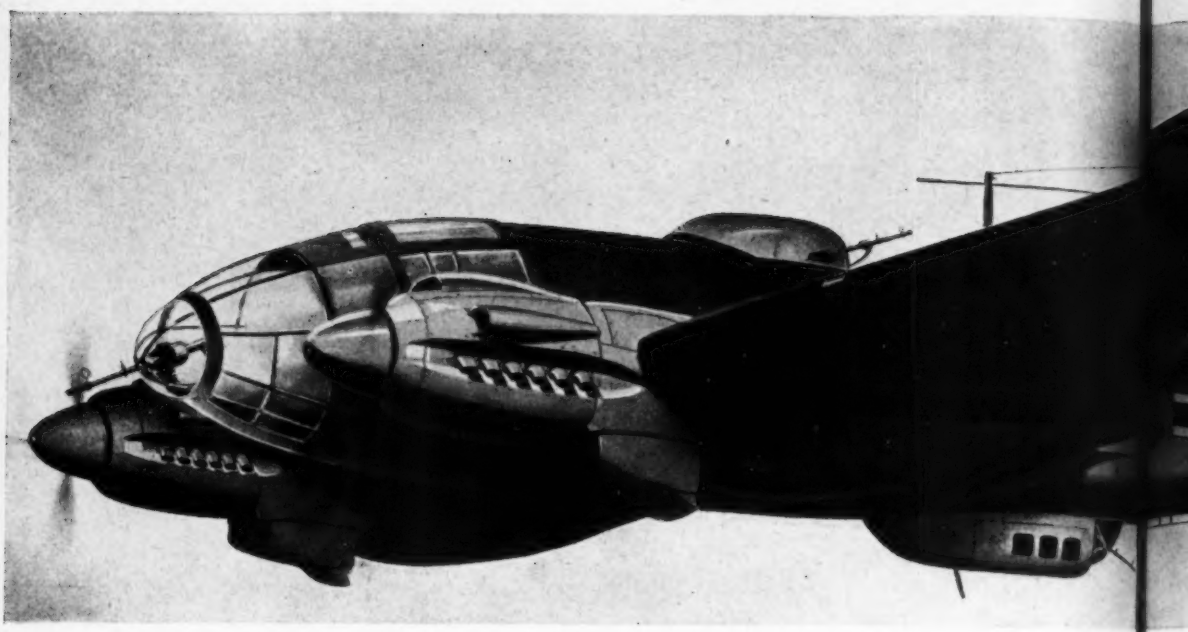
The design of the He 111 bomber is based on that of a transport machine which was built "at the suggestion of Luft Hansa" in 1935. This shapely low-wing monoplane was originally powered with two 660 h.p. B.M.W. VI glycol-cooled vee-twelves, though the installation of more powerful supercharged inverted engines was envisaged. With the B.M.W.s the top speed was about 214 m.p.h., and with the early type of Daimler-Benz DB600 rather more than 250 m.p.h. Actually, the design of the He 111 followed that of the single-engined He 70, which, at the time of its introduction and for some years afterwards, was claimed to be, aerodynamically, the most efficient aeroplane ever to take the air.

As a commercial machine on Luft Hansa routes the He 111 was used only to a limited extent, but it was not long before the news found its way out of Germany that the type was in production as a high-speed bomber. Performance figures for the military version were withheld, but it was obvious that they could be little inferior to those of the transport version with the same power plants, for excrescences were kept down to a minimum.

The first military edition of the He 111 was designated the He 111K, and this type was delivered in very large numbers to the *Luftwaffe*. During the Spanish War units of He 111s formed part of the Condor Legion, and are said to have acquitted themselves well. Rather more than a year ago a modified version was introduced, having a redesigned nose and certain other alterations. This model is now widely used, and forms the subject of the large *Flight* drawing accompanying this article. The official designation of this design is not known, though it may be the Type H or the Type J to which a reference has appeared in the Heinkel house journal.

A specially prepared version of the He 111 (He 111U), flown by Flugkapitan Nitschke and Flugzeugführer Dieterle on November 22, 1937, covered 621 miles with a load of 2,200 lb. at a speed of 313 m.p.h.

A recent picture of one of the short-nosed Heinkel He 111s being refuelled during manœuvres. The motor which drives the fuel pump is in the tent on the left.



A specially prepared *Flight* drawing showing details of the latest type of Heinkel He 111 bomber. The machine shown has Daimler Benz DB 601 direct-injection engines.

The photograph below purports to show the pilot of an He 111 giving a rendering on his mouth organ of the *Horst Wessel* song as he flies along in formation.

Details of the nose gun mounting of the latest type of He 111 may be studied in the view above. The gun is of the standard German pattern and is belt fed from a peculiar magazine which saddles the breech portion.

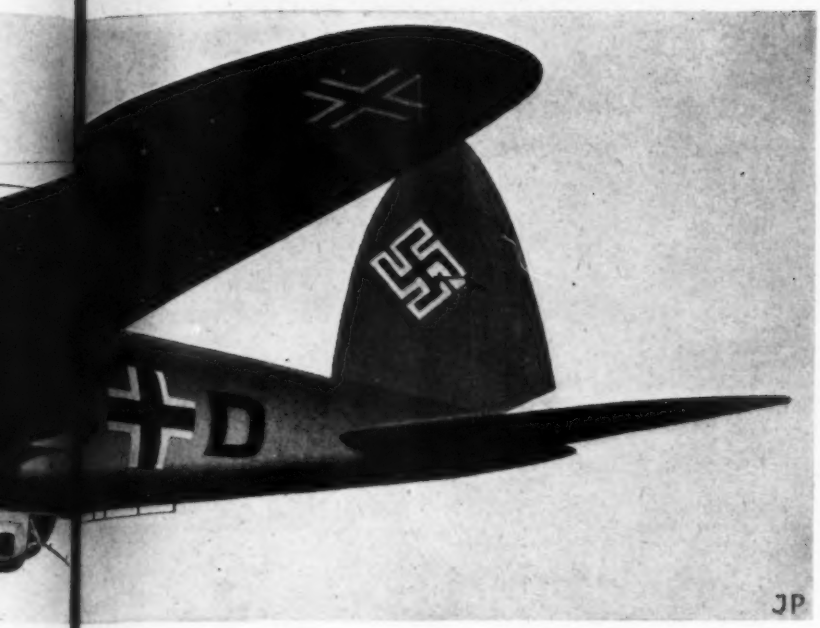
For purposes of description we may consider the He 111 as being used in two basic models, which we shall call the long-nosed and short-nosed versions. The following structural description of the long-nosed machine (the earlier type) will apply in the main to the newer edition, the peculiarities of which will be discussed later.

Characteristically, the He 111 has a low, cantilever monoplane wing of unusual plan form with elliptical outer panels. There are two spars, and the stressed-skin covering has flush riveting. Fuel tanks are installed in the centre section.

The fuselage, one portion of which is built integral with the centre-section of the wing, is of oval section and of extremely fine aerodynamic form. Corresponding with the main spars are two large bulkheads; a third bulkhead is placed farther aft, and there are the usual transverse frames Running fore and aft are longerons and stringers of channel section. The tail has cantilever surfaces with trimming tabs in the rudder and elevator.

The rearwardly retracting undercarriage folds into the engine nacelles. Each unit has two oleo legs and a low-pressure wheel which is entirely enclosed when the undercarriage is raised by hinged panels.

In the main the long-nosed He 111s have Daimler-Benz DB 600 or DB 601 engines, giving a maximum output of over 1,000 h.p. each. These drive three-bladed V.D.M. variable-pitch airscrews and have underslung radiators mounted forward of the undercarriage units. Some of the long-nosed machines have been fitted with Junkers Jumo 211 engines, which are similar in layout and



power to the Daimler-Benz units. Direct-injection engines of the DB 601 and Junkers Jumo 211 types have probably been fitted to a considerable extent.

Placed approximately in line with the leading edge of the wing is the pilot's cockpit. Forward of this the nose tapers down to a small diameter and is rounded off by a hemispherical transparent section which houses a standard rifle-calibre machine gun. In the original He 111 bombers this nosecap contained a horizontal slot in which the gun was traversed, though later long-nosed machines (and apparently all the short-nosed versions) have a kind of universal ball joint in which the gun is mounted. Considering that there is only one gun, that training must be difficult (in view of the speed of the machine and absence of any power assistance), and that the field of fire is in any case restricted, the nose defence can hardly be considered formidable.

A small transparent screen shelters the top fuselage gun position, the mounting itself probably being similar in principle to the Fairey "high-speed" type. The lower position, which houses the downward-firing gun, takes the form of a retractable "dustbin" not dissimilar to that fitted on the old Handley Page Heyford, though it appears hardly as well protected.

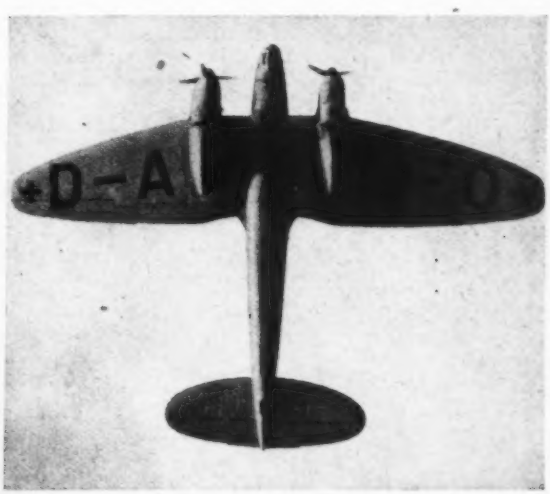
The bomb load (up to 4,400 lb.) is stowed vertically, being loaded from below into the individual cells. In all probability the excrescence beneath the nose of the machine houses part of the bomb-sight.

In considering the armament of these Heinkel bombers it is instructive to recall the remarks of Dr. Heinkel, made at the Conference of the Lilienthal Gesellschaft in Berlin last year. Dr. Heinkel showed diagrams and gave figures for the loss of speed experienced in a twin-engined bomber (obviously of the long-nosed He 111 type) due to the installation of two external gun positions in the top and bottom of the fuselage. Assuming the machine to be capable of 310 m.p.h. top speed without gun positions, a loss of as much as 42 m.p.h. might be occasioned by the external armament. Dr. Heinkel said that if a fixed, well-faired lower position were substituted for the retractable "dustbin," the loss in speed of the machine in "action" condition would be reduced by three-quarters to two-thirds. Accordingly we find the short-nosed He 111 with a permanent well-faired lower gun position in place of the retractable dustbin.

The main points on which the short-nosed He 111 differs from the long-nosed type are the design of the nose and of the upper and lower gun positions. In all probability the internal equipment has been somewhat rearranged. Both models have three guns. The short-nosed version displays a good deal more nasal transparency than the earlier machine. It would appear, in view of the fact that the new short-nosed Dornier Do 17 (known as the Do 215) has a forward position developed along somewhat similar lines, that the German authorities have demanded forward and downward vision even at the expense of performance.

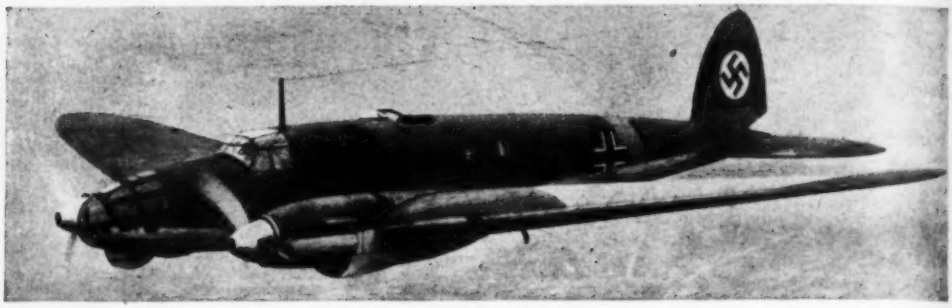
Unlike the long-nosed He 111, the short-nosed machine has no break in the fuselage lines for the pilot's windscreen, the top line being preserved as far forward as the nose gun-mounting. This, coupled with the shortening, gives a deeper, squatter appearance. It seems that there is an opening in the roof above the pilot's seat and that a small transparent panel can be raised just forward of it. Possibly this acts as a windscreen when the pilot's seat is in the raised position (*á la* Miles Master), though a photograph of a machine coming in to land shows the fuselage lines intact and the pilot completely enclosed.

The top fuselage gun has a larger transparent shield than formerly and the "permanent" lower emplacement, in



The characteristic plan form of the He 111 is well shown above.

Heinkel He 111s of the *Luftwaffe* seen on arrival in Prague last March. At this time Field Marshal Goering announced the formation of a new air command based on Vienna.



An He 111 bomber of the original series with Daimler Benz DB 600 engines.

which the gunner lies prone, is a characteristic excrescence.

Power plants of the short-nosed Heinkels are commonly the latest type Daimler-Benz DB 601 or Junkers Jumo 211 direct-injection engines with powers ranging up to 1,200 max. The airscrews are fully feathering V.D.M.s.

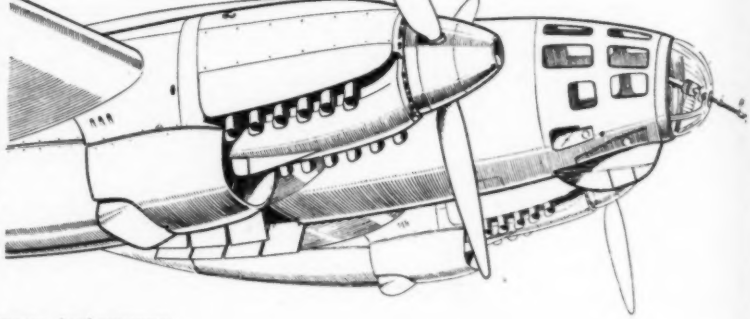
Performance figures for the latest type have not been issued, but the table below relates to the long-nosed type fitted with Daimler-Benz DB 601A engines delivering a maximum output of 1,070 h.p. each at 13,100ft.

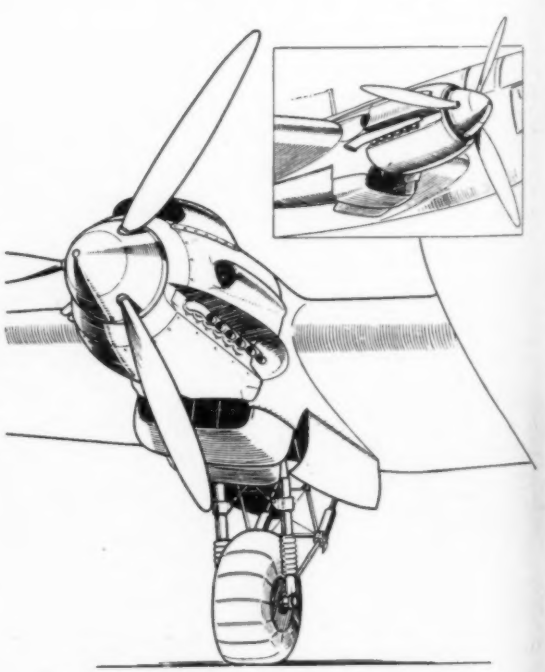
Apart from the twin-engined bombers already discussed, the Heinkel concern has constructed large numbers of single-engined bombers and reconnaissance machines for the *Luftwaffe*. The first type was a direct adaptation of the efficient He 70 already mentioned. As this model is obsolescent, or even obsolete, detailed description is unwarranted. Data issued for the He 170K, which seems to approximate to it, include a top speed in the neighbourhood of 250 m.p.h. (with Daimler-Benz engine) and a range of over 900 miles. The machines operated by the *Luftwaffe*, however, had unsupercharged B.M.W. VI engines and a correspondingly lower performance. Six bombs of 110 lb. each could be carried, and the defensive armament is two or three guns.

A more highly developed machine which, according to information from the Heinkel company, was put into production, is the He 118 dive bomber and ground-attack machine.

The He 118, when fitted with a Daimler-Benz DB-600 engine, is said to be capable of about 250 m.p.h., and to have a range of over 870 miles. For dive bombing it has fittings for a projectile weighing 1,100 lb., though no mention has been made of diving brakes. Obviously, a machine so clean would have greater need of these even than the Junkers Ju. 87. Four machine guns are fixed in the wing for attack work, and there is the usual free gun in the rear cockpit. Presumably, a further weapon could be installed to fire through the floor, as on the He 170K. In the "attack" condition the normal bomb load would comprise twenty fragmentation bombs of 20-22 lb. each.

Nothing has been heard of any new Heinkel bombers subsequent to the short-nosed He 111, but the name of Heinkel is certain still to be in the forefront of German bomber development.





The upper sketch shows the nose and engine installation of one of the earlier type He 111s (DB 600 engines). The large view below illustrates a DB 601 installation in a recent machine and the inset shows the appearance of a Jumo 211 nacelle.

HEINKEL HE 111K BOMBER

Span	73ft. 10in.		
Length	57ft. 5in.		
Height	12ft. 9in.		
Wing area	941.5 sq. ft.		
	With 2,200 lb. of bombs (normal weight)	With 4,400 lb. of bombs	With 2,200 lb. of bombs and long-range tanks
Weight empty	12,853 lb.	12,853 lb.	12,985 lb.
Weight loaded	24,867 lb.	27,304 lb.	26,543 lb.
Speed at sea level (m.p.h.)	220	—	—
Top speed (at 13,100ft.) (m.p.h.)	261	—	—
Max. cruising speed (m.p.h.)	257	—	—
Range at max. cruising speed (miles)	1,677	1,677	2,110
Normal cruising speed (m.p.h.)	214	—	—
Range at normal cruising speed (miles)	2,100	2,110	2,609
Climb to 6,560ft.	8 min.	—	—
Climb to 13,120ft.	17 min.	—	—
Climb to 19,680ft.	30 min.	—	—
Service ceiling	23,950	—	—
Take-off run (yd.)	415	525	505
Landing run (yd.)	383	470	450

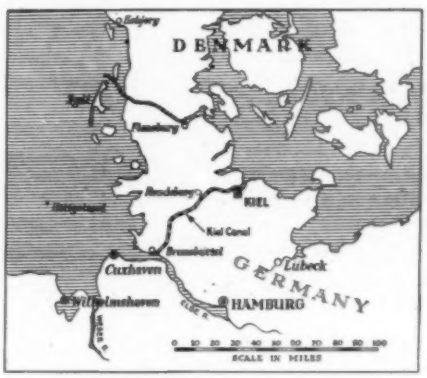
THE WAR in the AIR

Vivid Story of the Raids on Wilhelmshaven and Brunsbüttel

LAST week we gave what information was then available about the heroic raid by the Bomber Command of the Royal Air Force on German warships lying off the western end of the Kiel Canal, in which one of the German "pocket battleships" was seriously damaged by bombs, and another warship, supposed to be the light cruiser *Emden*, at Brunsbüttel was severely damaged. A fuller account by officers who led flights in the raid has now been released by the Ministry of Information.

Some of the airmen flew so close to one of the two warships which were bombed at Wilhelmshaven that they almost touched her masthead and could see in vivid detail what happened on her decks and on the quayside.

The pilots and crews were drawn from all parts of the British Isles, and there were also among them officers from Canada, New Zealand, Australia and Eire. The leader of the first flight to reach the objective had a Canadian as navigator.



Sketch map of the district in which the R.A.F. did such good work by raiding Wilhelmshaven and Brunsbüttel.

The leader of that flight gave the following account of his experiences: "We started for Wilhelmshaven at 4 p.m. on September 4. When we left, the afternoon was fine, but as we flew we ran into foul weather with heavy continuous rain. We reached Wilhelmshaven, after two hours of flying. As we turned on our last course, five minutes away from Wilhelmshaven, the weather cleared for a few minutes. Breaking the flight formation we flew singly into the Schilling Roads.

"We could see a German warship taking on stores from two tenders at her stern. We could even see some washing hanging on a line. Undaunted by the washing we proceeded to bomb the battleship. Flying at 100ft. above mast height all three aircraft in the flight converged on her. I flew straight ahead. The pilot of the second aircraft came across from one side, and the third crossed from the other side.

"When we flew on top of the battleship we could see the crews running fast to their stations. We dropped our bombs. The second pilot, flying behind, saw two hit. We came round, and the ship's pom-pom guns began to fire as we headed for home. My navigator saw shells bursting almost on the tail of the aircraft."

The second pilot, swooping across, took a photograph—which was subsequently found to be very blurred owing to the weather conditions at the time—just before he dropped his first bomb. By now the sky had clouded over again. The aircraft were driving through blinding rain. As this bomber turned on the homeward course the navigator noticed machine-gun tracer bullets nipping past their port wing tip. They looked like small blue electric sparks.

As the pilot of the third aircraft skimmed in his turn

"Flight" photograph

Hawker Hurricane single-seater fighters being groomed for action.

"Flight" photograph.

Spitfire fighters standing by, awaiting the signal.

towards the warship, he saw the first bomb drop from the second bomber.

"To me," he said, "it appeared to drop dead amidships."

By now the battleship's crew were all at action stations and the third pilot got, as he said, "some hot stuff." This pilot dropped his bombs and made a half circuit round the battleship. Wheeling, he noticed three bursts of A.A. fire at the leader's machine.

During the whole action only one German aircraft was seen. This was a German biplane, which flew past and disappeared. It is described as "a very poor-looking aircraft."

By 7.30 p.m. the flight were back at their station.

Over the Elbe

Another vivid account was given by the officers and crew of aircraft from another squadron which took part in the raids in the Kiel area. One of the aircraft was hit several times both by shells and bullets, but returned home safely, although two of the petrol tanks were punctured. The remaining two bombers were not hit.

The leader of this attack said:—

"We set out in fine weather. We were flying at 2,000ft., but we soon ran into a belt of cloud and came down to 300ft In the thick mist one pilot became separated from the others, but he took up station again after 10 minutes or so. We were near the German coast when half-a-dozen enemy fighters came out to engage us. A game of hide-and-seek in the clouds followed, and our craft were successful in eluding their pursuers and left them behind.

"Conditions grew worse and there was heavy rain for an hour. Then the weather improved and my bombers gained height, giving a wide berth to all the islands along the German coast. We observed considerable activity by enemy merchant shipping. We made our landfall accurately and flew up the Elbe estuary until we sighted a number of German naval vessels. We were then flying at 6,000ft. under a thin layer of cloud.

'The enemy held his fire until we were almost over our target. Then suddenly he opened with every gun he could bring to bear on us; it was terrific, especially the firing from the big ships, which seemed to carry seven anti-aircraft guns on either beam. You could watch the tracer shells rising after the flash of the gun in spirals and follow the whole of their course. We made our aircraft as difficult targets as we could by manœuvring. We then straightened out and dropped our bombs.

'At once we rose up into the clouds with the shells bursting round us and made for home, after an effective smack at the enemy. Our flight all returned home safely."

The leading aircraft was hit by a shell which almost singed the trousers of the wireless operator. Two of the petrol tanks were perforated and several bits of fuselage shot away, but in spite of everything it made its home station safely and landed without incident.

Other aircraft taking part in the raid returned independently. Two of them sighted a submarine making for Germany on the surface at high speed, as was shown by her wake. At the sight of the British aeroplanes she dived precipitately. An observer thought she left smoke behind her. As all the bombs had been dropped on the objectives in Germany, unfortunately not one was left, otherwise she would have been an easy victim. Another bomber passed right over the top of the Heligoland fortifications, but was unmolested either by fighters or anti-aircraft fire.

It will be recollected that the Germans first claimed to have shot down five of our machines. Later they claimed twelve. It is authoritatively stated by the Ministry of Information that our losses during the operations were "considerably fewer" than this second claim, and that it could only be described as "a deliberate exaggeration."

The Germans got ahead of the Ministry of Information by a broadcast to America which purported to be a conversation between a German pilot, Lieut. Crabbe, who is said to have shot down a British bomber, and three British prisoners of war in the naval hospital at Wesermuende, near Bremerhaven. The broadcast was evidently recorded and was repeated, being picked up in Britain on Friday, 15th. The prisoners of war were alleged to be (and the Air Ministry subsequently published their names as missing) P/O. L. J. Edwards, a New Zealander, who had burns on his face Sergt. Observer Booth, a Yorkshire man, who had a broken foot, and A/C. Slattery, of Tipperary, whose jaw was dislocated. According to the broadcast, all said they had been well treated. Slattery said that he was in the rear gun turret of his machine when it was brought down on the water and his face was dashed against the machine gun. He said that all the crew of his machine got out, but he had learnt that the pilot died a few days later.

The Week's Air Work

On *Tuesday, Sept.* 12, the Prime Minister and Lord Chatfield, Minister for Co-ordination of Defence, flew to France and back in a machine of the R.A.F. to attend the first meeting of the Supreme War Council. They conferred with M. Daladier, the French Premier, and Gen. Gamelin, the Commander-in-Chief of the French Army. The Prime Minister reported that the meeting fully confirmed the resolve of Great Britain and France to devote their entire strength and resources to the waging of the war and to give all possible help to Poland.

It was announced that day, after several considerations and re-considerations by the Ministry of Information, that the expeditionary force of the British Army had landed in France but had not yet been in action. Private reports added that units of the R.A.F. had been there for some time and had co-operated with the French Armée de l'Air in active operations on the Western Front. Mention has been made of both bomber and fighter units of the R.A.F., as well as of reconnaissance machines which had been engaged in photographing positions on the front. Of course, it went without saying that army co-operation squadrons would accompany the expeditionary force overseas, and some time ago it was stated by the Government

Ready for action. Fighter pilots receive final instructions.

"*Flight*" photograph.

in the House of Commons that it had been arranged for fighter squadrons also to accompany the Army. It had always been obvious to any student that army co-operation machines must have protection from fighters.

On *Wednesday, 13th*, the Prime Minister gave a second report on the course of the war in the House of Commons. As a result of his meeting with the French Premier, he said that the people of France and the people of Great Britain were alike determined, not only to honour to the full their obligations to Poland, but also to put to an end once for all the intolerable strain of living under the perpetual threat of Nazi aggression. "Our French allies," said Mr. Chamberlain, "are like ourselves a peace-loving people, but they are no less convinced than we are that there can be no peace until the menace of Hitlerism has been finally removed. *Il faut en finir.*"

He went on to say that further successful reconnaissance flights over Germany had been carried out by the Bomber Command, "and much useful information has been gained in the course of these flights of activities behind the German frontier." The Fighter Command, he said, remained in a state of instant readiness. The Coastal Command had continued to carry out extended reconnaissance and anti-submarine patrols, and a number of attacks had been carried out against enemy submarines.

Turning to air raid precautions and the conditions of the "black-out," Mr. Chamberlain said that though the lighting restrictions caused personal inconvenience, were dangerous to traffic, and slowed up important elements in the productive capacity of the country, they were required on strategic grounds, and all their details were the result of long experiments carried out by the Royal Air Force. He added that the Air Staff were equally interested in reducing to a minimum any slowing down of production, and if the restrictions appeared irksome they must be accepted for the moment as inevitable. The whole preparations of civil defence were conditioned by the speed with which hostile air attack can develop. Remote areas as well as big cities had to be blacked-out, not that they themselves were likely to be attacked, but that if they were lit up they would be a signpost to built-up areas which might be of greater military importance. Many of the complaints made were influenced by the fact that up to the moment when he was speaking we had not had any air raids, and it would be very dangerous to make any drastic modification of these strategic preparations until actual air raid experience had indicated the lines upon which modifications might safely be made.

Also on September 13 the German High Command announced that as the Polish leaders had been inciting the civil population to fight as *franc-tireurs* against the German troops (this seems to have been admitted in the Polish announcements) the German air corps, in co-operation with heavy artillery, would take "all suitable measures to make clear the uselessness of resistance."

On the same day Lord Halifax, Foreign Secretary, recalled in the House of Lords the pledges made by Hitler as well as by the British and French Governments not to bomb civilians. He went on: "The restrictions which His Majesty's Government have imposed on their own forces were based on the condition of similar restraint being observed by their opponents, and His Majesty's Government must hold themselves completely free, if such restraint is not in fact observed, to take such action as they may deem appropriate."

It will be interesting to recall here the words of Herr Hitler. In his speech to the Reichstag on September 1 he said: "I will not war against women and children. I have ordered my Air Force to restrict itself to attacks on military objectives."

On September 3, in reply to an appeal by President Roosevelt, he said: "That it is a precept of humanity in all circumstances to avoid bombing non-military operations corresponds entirely to my own attitude and has always been advocated by me. I therefore give my unqualified agreement to the suggestion that the Governments involved in the present hostilities should publicly make corresponding declarations. For my part I have already publicly made known in my Reichstag speech that the German Air Force has received the command to confine itself in its operations to military objectives. It is a natural condition for the maintenance of this command that the opposing Air Force should keep to the same rules."

No Murder by British Aircraft

Mr. Chamberlain, in the House of Commons, on the same day made a similar statement, adding that, whatever the length to which others might go, the British Government would never resort to deliberate attack on women, children, and other civilians for purposes of mere terrorism. Our strategy and tactics must be governed by one consideration, and one only—namely, the most effective prosecution of the war. If action of the kind suggested in the German announcement was taken, "it will inevitably further strengthen the resolve of ourselves and our Allies so to conduct our policy and so to prosecute the war as to ensure that the menace we are fighting, of which this may be another manifestation, is finally removed."

Opposition to armed forces by *franc-tireurs*, that is, by armed civilians, is certainly against the rules of war, and if such are captured there is no obligation to treat them as prisoners of war. They may quite legitimately be executed. Wholesale destruction of towns and villages by indiscriminate bombing and shelling is quite another thing. *Franc-tireurs* can hardly use any weapon except rifles, and therefore it should be quite possible for infantry or cavalry to deal with them.

It will be remembered that on September 6 Mr. Butler, Under-Secretary for Foreign Affairs, stated in the House of Commons that his information tended to show that the bombing by German aircraft in Poland had been generally against military objectives, though many civilian casualties had occurred. That would seem to have been the general

impression of observers, but this theory was considerably upset by a report which the United States Government published from its Ambassador to Warsaw, Mr. J. Drexel Biddle. Among other instances he cited attacks on his villa in a defenceless open village, the destruction of a sanatorium in woods near Otwock, involving the deaths of ten children, damage to a hospital train carrying wounded soldiers, with the red cross clearly marked on the roof, drawn up at the uncovered east station in Warsaw, and the destruction of a Girl Guide hut in which twelve girls were killed.

The German Luftwaffe has, in fact, played a highly important part in the invasion of Poland. In numbers, and perhaps in quality of machines, the Polish air arm has been completely overwhelmed, though there is no doubt that the Polish airmen have fought against odds with the courage which is inherent in their race. Only through this great air superiority have the Germans been able to use the tactics which they have used, and to advance at such a speed. They have invaded by means of a number of separate converging columns, with the flanks of each protected and joined to the next column by means of their aircraft. They have repeatedly attacked and hampered the Polish concentrations, movements, and counter-attacks. Never before, in the history of open warfare, have Generals had such complete knowledge of the movements behind the enemy's lines as the Germans have had in this campaign, and never have they had such a means of interfering with those movements.

On the Western Front the Germans will have no such superiority, and to judge from the laconic reports issued up to date the Allies seem to be more than holding their own in the air, to be proceeding successfully with reconnaissance of the enemy's position, and to be using their bombers to hinder reinforcements from reaching the Westwall. There has been no claim that the movements of the French troops have been hindered by German bombers.

A German military aircraft, presumably a seaplane, on Wednesday, 13th, shot down a Dutch military seaplane, a Fokker, which it did not recognise until too late. The Fokker fell into the sea off the island of Ameland, and the German machine alighted and picked up its crew of four. Two of them were injured. All were taken to the German island of Nordeney. The German Minister at The Hague has expressed regret and offered compensation.

Statements from the Polish side allege that the Germans followed up their threat by widespread bombing in many districts, with immense civilian casualties. In Warsaw the civilian casualties are said to outnumber the military killed and wounded. Particularly revolting are reports from various sources that on many occasions German machines have come low and machine-gunned civilians, fire brigades, etc., in the streets of towns and villages.

An ultimatum was sent to the military commander of Warsaw, demanding the surrender of the city within twelve hours, and allowing a further twelve hours for civilians to leave by two specified roads. Failing compliance the city would be treated as a theatre of war. At first no answer was returned, but later it was reported that the Polish commander was considering the matter. Meantime the threatened destruction of the city was postponed by the Germans.

To the surprise of the world, the Soviet Army crossed the east frontier of Poland on Sunday, 17th, without declaring war on Poland. The situation has become in consequence very confused.

A little light relief to the horrors of war comes through from Amsterdam. It is reported there that the people in western Germany have been officially told that anyone caught reading the pamphlets dropped by the R.A.F. will be immediately imprisoned, and serious cases will be punishable with death. Only children under ten years old and the police are allowed to pick up the pamphlets, as they are not likely to comprehend the truths which the pamphlets tell.

One good point about the German character (would that it were a British quality too!) is that they do not like litter lying about. How the efforts of the R.A.F. must have distressed their tidy souls! Twelve or more million leaflets take a lot of picking up.

Royal Air Force Gazette

Continued from "Gazette" dated Sept. 8

Royal Air Force

General Duties Branch

The following Flying Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—J. B. Tait (May 6); B. Bell (July 7); J. A. Field (August 1); D. L. Mmlot, D.F.C. (August 13); D. J. McGlinn (August 18); W. W. Campbell (August 26).

P/O. J. H. Kennard takes rank and precedence as if his appointment as Pilot Officer bore date April 4, immediately following P/O. A. E. Bull in the June gradation list. Reduction to take effect from July 17. Acting Pilot Officer on probation G. Board takes rank and precedence as if his appointment as Acting Pilot Officer on probation bore date May 27. Reduction to take effect from August 2.

The following are seconded for service with the Government of Canada (August 19):—Flt. Lts. R. H. Waterhouse, K. J. Mellor, R. E. Dupont; F/O.s D. J. McGlinn, W. S. L. Smallman, K. J. McDonald, T. J. A. Cresswell.

Flt. Lt. A. P. W. Cane is transferred to the Reserve, Class A (September 1).

Accountant Branch

F/O. P. W. Hill is granted the acting rank of Flight Lieutenant (July 8); F/O. H. S. Maurice-Jones relinquishes the acting rank of Flight Lieutenant (August 18).

Commissioned Engineer Officers

The following Warrant Officers are granted commissions as Flying Officers on probation with effect from the dates stated and with seniority of June 12:—J. Gallie (August 11); W. H. C. Syzling (August 15); M. W. S. Saunders (August 17); W. Rudd, E. G. Clarke (August 21); C. H. Lucas, E. S. Gentry, P. S. V. Vallis, V. A. B. Dixon (August 22); R. Nicholls, F. C. Steadman (August 23).

The following Flying Officers on probation are confirmed in their appointments on the dates stated:—A. J. Shimmons (May 26); T. V. Nelson (August 4).

Commissioned Signals Officers

The following Warrant Officers are granted commissions as Flying Officers on probation with effect from the dates stated and with seniority of June 12:—W. H. York (August 10); L. G. Yabsley (August 23).

Commissioned Armament Officer

Flying Officer on probation R. H. Howse is confirmed in his appointment (June 30).

Air Ministry, Sept. 11

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The following are granted commissions in Class CC in the ranks and on the dates stated:—

Squadron Leader (Honorary Wing Commander).—Wing Cdr. W. J. Ryan, C.B.E. (R.A.F. Ret.) (July 3).

Squadron Leaders.—Maj. G. J. B. E. Massy, M.C. (April 17); Capt. R. T. H. Watson (May 2).

Flight Lieutenants (Honorary Squadron Leaders).—Sqn. Ldr. P. Murgatroyd (R.A.F. Ret.) (September 29); Lt. Col. E. A. K. Crossfield, M.C. (I.A. Ret.); Lt. Col P. R. Quayle (I.A. Ret.) (April 3); Lt. Col. G. F. R. Wingate, O.B.E. (R.A.R.O.) (April 12); Lt. Col. G. R. V. Hume-Gore, M.C. (April 14); Lt. Cdr. A. C. Bell (R.N. Ret.) (July 3); Capt. F. G. B. Reynolds (July 6); Capt. M. Tod (July 14).

Flight Lieutenants.—H. D. H. Wardrop (October 5, 1938); Sec. Lt. G. W. Minto (April 27); Sec. Lt. E. G. Morris (May 11); Lt. V. M. Smith (May 16); D. K. Cameron (May 22); Maj. E. J. Bell (I.A., Ret.), Capt. D. A. Macfie, Capt. W. S. Newton-Clare, M.B.E. (June 12); Maj. R. K. B. Walker, M.C. (June 24); Maj. L. J. L. Pullar, M.C. (June 26); F/O. F. W. Wrench (R.A.F., Ret.) (June 29); Capt. W. H. Costello (T.A.R.O.), Maj. V. W. H. Venour, M.B.E. (June 30); Capt. H. H. Harries (July 1); Capt. E. A. Croft, Lt. Col. W. L. Hailes, M.C. (I.A., Ret.) (July 3); Lt. T. Forrester (R.A.R.O.), Capt. G. D. Sandford (R.A.R.O.) (July 7); Maj. K. W. Brand (Sp. U.L., I.A.), Lt. E. H. Hereford, Lt. L. W. C. Pearce-Gervis, Ord. Lt. L. Vinton, M.B.E. (R.N., Ret.) (July 10); Maj. G. Forrest (Sp. U.L., I.A.) (July 13); Sec. Lt. G. E. D. Low (July 16); Lt. J. E. W. Sugden (July 21); Engr. Cdr. F. W. Farlow (R.N., Ret.) (July 23); R. C. A. Brooke-Beer, Lt. L. S. Cundell (R.A.R.O.), Capt. H. J. Larkin, D.F.C., L. C. Prendergast, F/O. G. S. Smith, M.B.E., Flt. Lt. W. H. Stiles (R.A.F.O.) (July 24); Lt. H. F. W. Robinson (July 28); Maj. R. E. Lewis (July 29); Flt. Lt. A. C. Walker (R.A.F.O.) (July 31); Flt. Lt. D. M. Rees, M.B.E. (R.A.F., Ret.) (August 4); Lt. C. G. L. Bowley (August 8).

Flying Officer (Honorary Flight Lieutenant).—Lt. T. M. B. Newton (R.A.R.O.) (May 20).

Flying Officers.—Lt. H. E. C. Collins, Capt. E. K. Price (R.A.R.O.) (May 20); Capt. B. F. Williams (I.A., Ret.) (July 11); Lt. F. L. Wheeldon, D.S.O. (July 13); Lt. J. G. Kerr (July 24); Lt. E. A. Hulme (July 26).

The following are granted commissions in Class CC as Flight Lieutenants on the dates stated and are granted the honorary rank of Squadron Leader with effect from April 1:—Capt. R. B. Donovan (R.A.R.O.) (January 23); Lt. Col. R. M. Trail, M.C. (I.A., Ret.) (February 27); Lt. Col. B. I. Jones, D.S.O., M.C. (I.A., Ret.); Lt. Col. H. G. Rivett-Carnac (I.A., Ret.) (March 6); Lt. Col. H. S. I. Pearson (I.A., Ret.) (March 7).

A. W. Wood is appointed to a commission in Class CC as Flying Officer with effect from May 9 and is granted the rank of Flight Lieutenant with effect from June 12; D. B. Smith 70998) is granted a commission as Flying Officer in Class BB with effect from April 19 and with seniority of March 1, 1932.

The following Flying Officers are promoted to the rank of Flight Lieutenant (August 26):—R. W. Jackson, R. C. Warner, G. O. St. J. Morris, J. M. Wintour.

The following Flight Lieutenants are granted the rank of Squadron Leader on the dates stated:—G. D. H. Ross (April 27); J. H. Harris (May 22); G. E. Gordon-Duff (June 5); G. F. E. Harrison (June 21); H. E. F. Saunders (July 15); A. Belle (July 20); G. A. Wells, M.C. (August 1).

The following Flight Lieutenants are granted the rank of Squadron Leader in Class CC on the dates stated:—H. H. S. Scott, D.S.M. (April 12); F. T. McElwee (Flight Lieutenant, R.A.F., Ret.) (June 9); V. R. S. White, M.C. (Flight Lieutenant, R.A.F., Ret.) (July 21); W. R. Castings, M.B.E. (Flight Lieutenant, R.A.F., Ret.) (July 24); F. J. Taylor (Honorary Squadron Leader) (July 25).

The following Flying Officers are granted the rank of Flight Lieutenant on the dates stated:—J. M. Wells (June 23); A. V. Le Maistre (July 1); H. J. Crampton (July 6); R. M. Waddington (Honorary Flight Lieutenant) (July 15).

Flt. Lt. D. E. Ward is granted the acting rank of Squadron Leader (August 25).

The following Flight Lieutenants are granted the acting rank of Squadron Leader in Class CC on the dates stated:—Flt. Lt. A. J. Nightingale (R.A.F.O.) (June 10); Flt. Lt. W. G. Nicholls (R.A.F.O.) (June 20).

The following Flight Lieutenants are granted the honorary rank of Squadron Leader on the dates stated—F. Pyle (April 1); B. C. Adamson, A. W. Clemson, O.B.E., D.S.C., R. S. Martin (June 9).

Flt. Lt. (since promoted to Sqn. Ldr.) R. C. Whitle is granted the honorary rank of Squadron Leader from June 9 to 29 inclusive.

The following Flying Officers are granted the honorary rank of Flight Lieutenant (June 9):—C. H. Boreham, M. E. B. P. Storrie.

F/O. F. W. Yates is transferred from Class A to Class C (February 16); Group Capt. P. W. L. Broke-Smith, C.I.E., D.S.O., O.B.E., relinquishes his commission on cessation of duty (June 17).

The following Flight Lieutenants relinquish their commissions on cessation of duty on the dates stated:—T. G. Jefferies, D.F.C. (June 25); G. D. Hill (Honorary Squadron Leader) (August 27).

Flt. Lt. R. C. Savery, D.F.C. (Flight Lieutenant, R.A.F., Ret.) relinquishes his commission in Class CC on cessation of duty (July 31).

The following Flight Lieutenants relinquish their commissions on appointment to short-service commissions in the Air Branch of the Royal Navy on the dates stated—H. L. McCulloch: (June 1); J. B. Wilson (June 19).

F/O. (Honorary Sqn. Ldr.) A. C. Horsbrugh relinquishes his commission on cessation of duty (April 1); F/O. E. A. Scales relinquishes his commission on completion of service and is permitted to retain his rank (July 7); F/O. M. Horan relinquishes his commission on completion of service (August 13).

Equipment Branch

The following Squadron Leaders are granted commissions in Class CC as Flight Lieutenants (Honorary Squadron Leaders) on the dates stated:—E. D. Galloway (R.A.F.O.) (May 12); F. Tedman, M.B.E. (R.A.F., Ret.) (July 4).

The following are granted commissions in Class CC as Flight Lieutenants on the dates stated:—Payr. Lt. V. F. Williams (R.N., Ret.) (May 2); Maj. G. W. Hobbs (May 5); Capt. (Quartermaster) W. H. Scott-Badcock (May 11); Lt. J. H. Thacker (R.A.R.O.) (May 15); Capt. G. F. Mulholland (May 21); Capt. E. N. Appelbe (July 20); F/O. P. H. Hunter (R.A.F., Ret.) (August 1).

F/O. R. Bassett relinquishes his commission in Class B on completion of service (June 17).

Royal Air Force Volunteer Reserve

General Duties Branch

P. F. Cazenove is granted a commission as Pilot Officer with effect from August 24 and with seniority May 16, 1938.

The following are granted commissions as Pilot Officers (August 28):—W. K. Davison, A. E. Houseman.

Rear Admiral W. P. Mark-Wardlaw, D.S.O., is appointed honorary Wing Commander (June 1).

The following are appointed honorary Flight Lieutenants on the dates stated—Capt. G. I. S. More, O.B.E. (R.N., Ret.) (March 30); Lt. H. J. H. Dayson, D.S.O. (I.A., Ret.) (June 1); Col. (Hon. Brig.) S. Mead, D.S.O. (R.A.R.O) (July 17); Capt A. H. Smyth (R.N., Ret.) (July 18); Lt. Col. G. S. McNaught, D.S.O. (R.A.R.O.) (July 20); Lt. (Quartermaster) L. G. Dunn, M.M. (R.A.R.O.) (July 24); Maj. K. P. Atkinson, M.C., Maj. C. W. Cripps, D.S.O., Lt. Col. A. R. Thomson, M.C. (I.A., Ret.) (July 25); Lt. Col. R. G. Maclaine, M.C., Maj. R. S. Spurrier (July 31).

F/O. J. A. Champness is transferred from Class C to Class AA (July 31); F/O. D. B. Smith relinquishes his commission on appointment to a commission in the Reserve of Air Force Officers (April 19).

Administrative and Special Duties Branch

Brig.-Gen. A. C. Critchley, C.M.G., D.S.O., is granted a commission as Flying Officer with the acting rank of Air Commodore (paid) (August 30).

The following are granted commissions as Pilot Officers on probation with the honorary ranks stated (August 22):—*Wing Commander.*—J. B. Newman, M.B.E. *Squadron Leaders.*—P. Alderton, J. F. Arnold, S. Barraclough, M.B.E., A. Craven, J. Fox, E. T. Symonds, T. H. A. Vivers. *Flight Lieutenants.*—R. G. Birkby, F. S. Bloomfield, G. Doyle, G. G. Edwards, L. Evans, C. McG. Gateley, J. R. Hughes, B. J. Lynch, D. Muir, I. E. Roberts. *Flying Officers.*—D. J. Garland, A. F. Jones.

The following are granted commissions as Pilot Officers on probation on the dates stated:—J. S. Hicks (March 27); J. S. Hamilton (April 6); G. G. G. Graves (April 11); F. N. McDowell (April 28); D. M. Faure (August 23).

F. C. Fayers is appointed Honorary Group Captain (August 25); A. R. Dudgeon is appointed Honorary Flying Officer (August 25).

Equipment Branch

Acting P/O. H. A. S. Gothard is confirmed in his appointment (August 14).

The following Acting Pilot Officers are graded as Pilot Officers on the dates stated:—S. R. Fairhead, C. J. Newton, O. H. Downing, G. H. Grasty, F. W. Hamblin, N. C. Kirkham, W. R. B. Phipps, G. S. Sawtell, R. W. Tyler, D. F. Williams, E. Howett (August 23); H. A. J. Bolwell, A. G. Dettmer, F. J. Smith, H. F. R. Temple (August 30).

P/O. A. G. R. Revell relinquishes his commission on account of ill-health (August 30).

Medical Branch

K. F. Caird, M.B., Ch.B., F.R.C.S., is granted a commission as Flight Lieutenant (August 26).

Meteorological Branch

The following are granted commissions in the ranks stated (August 25):—Sqn. Ldr. J. S. Farquharson, Flt. Lts. C. J. Boyden, A. G. Forsdyke, P/O. J. A. Franks, Acting Pilot Officers on probation H. Hanks, F. H. Lowe, W. G. Moore, B. O. F. Tott.

Auxiliary Air Force

General Duties Branch

No. 504 (COUNTY OF NOTTINGHAM) SQUADRON.—Acting P/O. P. T. Parsons is confirmed in his appointment and graded as Pilot Officer (July 21). No. 608 (NORTH RIDING) SQUADRON.—The following are granted commissions as Acting Pilot Officers (June 18):—A. D. Baird, D. A. Braithwaite, S. G. Fenwick, J. Robinson. No. 610 (COUNTY OF CHESTER) SQUADRON.—M. G. Pascalis is granted a commission as Acting Pilot Officer (August 22). No. 611 (WEST LANCASHIRE) SQUADRON.—The following Acting Pilot Officers are confirmed in their appointments and graded as Pilot Officers (July 21):—D. A. Adams, H. F. Leech. P/O. R. K. Crompton is promoted to the rank of Flying Officer (May 13). No. 615 (COUNTY OF SURREY) SQUADRON.—J. A. P. McClintock is granted a commission as Acting Pilot Officer (July 24); P/O. P. Collard is promoted to the rank of Flying Officer (August 4); P/O. P. F. Cazenove relinquishes his commission on appointment to a commission in the Royal Air Force Volunteer Reserve (August 24). No. 909 (COUNTY OF ESSEX) SQUADRON.—N. E. Poole is granted a commission as Pilot Officer (August 25). No. 939 (WEST RIDING) SQUADRON.—R. C. Crawley is granted a commission as Pilot Officer (August 22).

Equipment Branch

No. 3 BALLOON CENTRE.—E. T. Beer is granted a commission as Pilot Officer (August 8).

Royal Air Force

General Duties Branch

W. J. W. Kingston (from Reserve) is granted a short-service commission as Pilot Officer on probation for six years on the active list (August 31).

The following are granted short-service commissions as Acting Pilot Officers on probation for six years on the active list (August 28):—C. B. Rigg, B. V. Kerwin.

The following Group Captains are promoted to the rank of Air Commodore (September 1):—J. O. Andrews, D.S.O., M.C., J. C. Slessor, D.S.O., M.C.

The following Flying Officers (Acting Flight Lieutenants) are promoted to the rank of Flight Lieutenant on the dates stated:—R. T. F. Gates (July 16); M. V. Blake (seniority December 9, 1938) (September 9).

P/O. F. B. Harris is promoted to the rank of Flying Officer with effect from April 28 and with seniority of March 31; P/O. R. B. Harris is promoted to the rank of Flying Officer (September 8).

The following Flight Lieutenants (R.A.F., Ret.) are granted the honorary rank of Squadron Leader (June 9):—J. C. Andrews, M.B.E., J. J. Teasdale.

P/O. R. J. MacDonogh takes rank and precedence as if his appointment bore date December 21, 1938. Reduction to take effect from August 18.

The following resign their short-service commissions on the dates stated:—F/O. P. H. R. R. Terry (September 5); P/O. H. K. Gibson (September 2); P/O. J. B. Golden (September 9); Acting Pilot Officer on probation J. Rashleigh (September 2).

F/O. J. R. Henderson relinquishes his short-service commission on account of ill-health (September 1); P/O. D. O. Marshall relinquishes his short-service commission on account of ill-health (September 1); the short-service commission of Acting Pilot Officer on probation G. Broad is terminated on cessation of duty (September 1).

Equipment Branch

The short-service commission of Pilot Officer on probation R. D. Baird is terminated on cessation of duty (September 8).

THE INDUSTRY

An Aluminium Development

THE London Aluminium Company, of Witton, Birmingham, is a name which must be known throughout the aircraft industry. Since the last war period it has accounted for a considerable volume of aircraft work particularly on the sheet metal side. It is interesting to note therefore that this company has been acquired by Williams (Birmingham), Ltd., of Goodman Street, Birmingham.

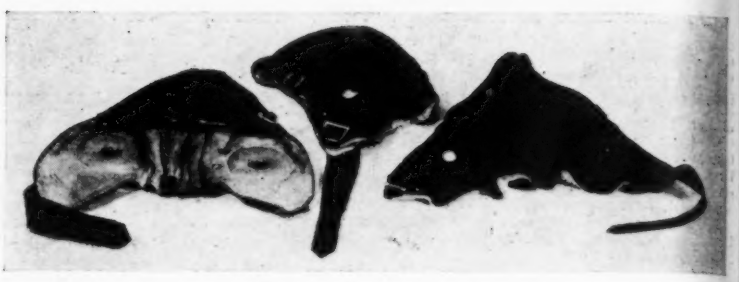
Although the two companies will continue to operate separately, developments will take place at the Witton Works to cater even further for the needs of aircraft constructors. The factory at Witton covers 5½ acres and is equipped with all the necessary modern plant and equipment for light sheet metal work, stampings, spinning and general construction contracts.

A Book of Useful Hints

THERE must be many readers of *Flight* who will be interested in the latest edition of *Two-stroke Motor Cycles and Autocycles*, if only on the score that the class of vehicle referred to in this handy 150-page book is renowned for its phenomenally economical mileage.

The book explains in a clear and simple manner practically everything that the novice could wish to know, at the same time offering various hints and tips which should prove invaluable, even to more experienced enthusiasts.

Two-stroke Motor Cycles and Autocycles is published by Iliffe and Sons, Ltd., of Dorset House, Stamford Street, London, S.E.1, price 2s. 3d. post paid.



Three examples of leather flying helmets made by Cookson and Clegg Ltd., of Blackburn. Each helmet is fitted with elastic across the nape of the neck in addition to the usual strap across the forehead.

For Head Comfort

AN essential feature of a flying helmet is that it must fit the head perfectly, if it is to be of any use. If too tight, it will cause headaches, while if too loose it will fail to serve its purpose on account of cold draughts. Adjustable straps are the usual means by which a helmet can be made to fit the head, but Cookson and Clegg, Ltd., of Mincing Lane, Blackburn, have introduced a range of helmets with elastic across the nape of the neck in addition to the usual forehead strap across the front. These helmets have the usual flaps to secure earphones and on the inside of each earpiece is fitted a ring of sponge rubber. A wide chin strap is fitted with a large tongued buckle.

In spite of the comparatively low price of 10s. 6d. each helmet is well finished and is obtainable in various styles of soft black and green leather and various shades of suede, with chamois leather linings.

In Brief

A MANUFACTURERS' licence to produce in Great Britain the Ciamberline indicating anemometer, with metric height correction, has been purchased by Smith's Aircraft Instruments from I.S.S.A., of Bergamo, Italy.

* * *

Aluminium Union, Ltd., has placed a contract with The Brightside Foundry and Engineering Co., Ltd., of Sheffield, for aluminium rolling mill plant to be delivered to the company's associate, The Australian Aluminium Co., Pty., Ltd., of Sydney.

* * *

The aircraft industry continues to support the technical Press. This week the Reynolds Tube Co., Ltd., announces its policy.

CUT HERE

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